



SUBSTITUTE SPECIFICATION

HANDHELD ULTRAVIOLET GERMICIDAL SYSTEM

BACKGROUND

[0001] Onychomycosis is a fungal infection of a nail, commonly a human nail. The condition can be caused by a fungus, such as dermatophytes, yeast, or mould. The fungus can invade the nail plate or nail bed, potentially causing the nail to separate from the nail bed, a thickening of the nail, discoloration, and other adverse symptoms. A convenient treatment for onychomycosis is needed that is both fast and safe for a care provider.

SUMMARY

[0002] Provided are devices and methods for treating onychomycosis. In a first embodiment, an ultraviolet (UV) light source is directed at an infected area, a device detects whether a hand of the user is an adult hand, and if so, the light source is powered on. The light source may be powered off after the passage of a predetermined amount of time.

[0003] In another embodiment, a device is provided for treating onychomycosis. The device may include a UV light source, a UV transmissive cover for the light source, a safety sensor for preventing powering on of the light source unless the user is an adult, and a power source for the light source. The device may also include a ballast circuitry and/or a timing circuitry.

BRIEF DESCRIPTION OF THE DRAWINGS

[0004] Figure 1 depicts an example of a portable handheld germicidal system.

[0005] Figure 2 is a flow chart depicting an example of a method for treating onychomycosis.

DETAILED DESCRIPTION

[0006] FIG. 1 illustrates an example of a portable handheld germicidal device 101 which may be pen light sized. Such a device may be used in conjunction with a method of treating onychomycosis of the human nail. Handheld germicidal device 101 may be used to treat fungal infection of nail 120.

[0007] The device 101 may include a pen light sized quartz UV lamp 103 that emits light in the germicidal range extending from a first end 102. In one embodiment of the device 101, the lamp #3 emits light having a wavelength of 254 nanometers (nm). The lamp may be powered via ballast circuitry 104 by battery 105 which include four AA batteries in this embodiment. A quartz cover 106 surrounding the UV lamp 103 fits into a holder 107 that also acts as a shock absorber for the lamp 103. The holder 107 may compress and bend as appropriate, should the cover 106 and the lamp 103 be bumped or jarred. A UV filter 108 may be securely mounted to one side of device 101. The UV filter 108 may be made of plastic and may serve to shield the user's eyes from potentially harmful levels of UV rays. The device 101, may also include an additional reflective cover (not shown) which may be used to reflect and direct the UV light.

[0008] Adult hand safety sensors 110 may be incorporated into the germicidal device 101. Sensors 110a and 110b work with a continuity sensor circuit 111 which may prevent the UV lamp from turning on until the unit is firmly gripped by the hand of an adult. Continuity sensor circuit 111 may be located anywhere between the UV lamp 103, the ballast circuitry 104, and the batteries 105. Sensors 110 may include, for example, capacitive-type sensors that sense the difference in capacitance of a moist adult hand versus the surrounding air. When the continuity sensor circuit 111 determines that device 101 is firmly gripped, it may be assumed that the hand is an adult hand because, in part, of the relative locations of sensors 110a and 110b. Sensor circuit 111 may then allow the lamp 103 to be turned on. Germicidal device 101 may also include timing circuitry 112 which may power off lamp 103 after the passage of a predetermined amount of time.

[0009] FIG. 2 is a flowchart depicting an example of a process 200 for treating onychomycosis. At operation 201, a device 101 comprising a UV light source 103 and associated UV transmissive cover 106 is directed at an area of a body to be disinfected, such as a human toe nail. At operation 202, the device senses whether it is being held by an adult. At decision 203, if the device 101 is held by an adult, then at operation 204, the light source 103 is activated, emitting UV radiation having a wavelength in the range of, for example, 254 nm, disinfecting the area of the body. At operation 205, the light source 103 may be automatically powered off after the passage of a certain predetermined amount of time.